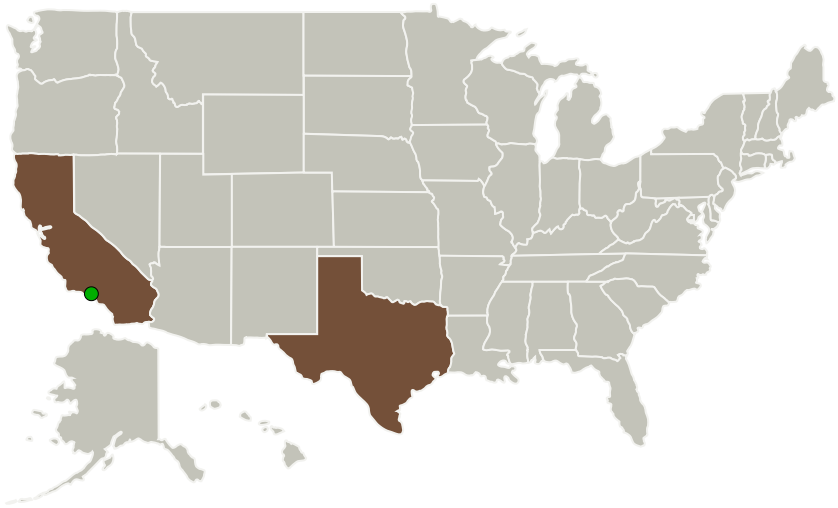
# Lab-on-a-Robot Platform for in-situ Planetary Compositional Analysis, Phase I

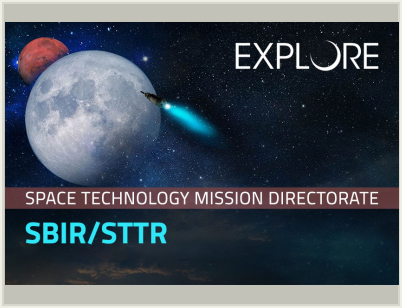
Completed Technology Project (2012 - 2013)

## Project Introduction

HJ Science & Technology, Inc. and the University of Texas at San Antonio propose a joint venture to demonstrate the feasibility of a mobile "lab-on-a-robot" platform capable of in-situ, high throughput, and simultaneous identification and characterization of universal classes of ions, molecules, and biomolecules for NASA planetary and small body surface chemistry studies. The innovation of the proposed technology combines contactless conductivity detection, on-chip automated sample processing, miniaturized instrumentation integration, and robotic and wireless technologies. If successful, such a mobile platform for the miniaturized instrument will lay the groundwork for future NASA in situ robotic missions. In Phase I, we will show the basic functionalities of the proposed technology by demonstrating the capability of (1) the contactless conductivity detection to detect selective ions that are relevant to the aqueous chemistry and reactivity of the Martian surface material, (2) controlling the device as well as collecting and analyzing the data wirelessly, and (3) integrating the contactless conductivity detection technology into our current optical detection based instrumentation. In Phase II, the main effort will direct towards the development of a "lab-on-a-robot" prototype to be delivered to JPL, which will include optical and contactless conductivity detection capabilities, wireless communication, and on-chip automated sample processing.

## Primary U.S. Work Locations and Key Partners



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**Small Business Innovation Research/Small Business Tech Transfer**

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| Organizations Performing Work | Role | Type | Location |
|---|---|---|---|
| HJ Science & Technology, Inc. | Lead Organization | Industry<br>Small Disadvantaged Business (SDB) | Berkeley, California |
| Jet Propulsion Laboratory(JPL) | Supporting Organization | NASA Center | Pasadena, California |
| The University of Texas at San Antonio(UTSA) | Supporting Organization | Academia | San Antonio, Texas |

| Primary U.S. Work Locations | |
|---|---|
| California | Texas |

## Project Transitions

**February 2012:** Project Start

**February 2013:** Closed out

**Closeout Documentation:**

- Final Summary Chart*(https://techport.nasa.gov/file/140341)*

## Organizational Responsibility

**Responsible Mission Directorate:**

Space Technology Mission Directorate (STMD)

**Lead Organization:**

HJ Science & Technology, Inc.

**Responsible Program:**

Small Business Innovation Research/Small Business Tech Transfer

## Project Management

**Program Director:**

Jason L Kessler

**Program Manager:**

Carlos Torrez

**Principal Investigator:**

Hong Jiao

**Co-Investigator:**

Hong Jiao

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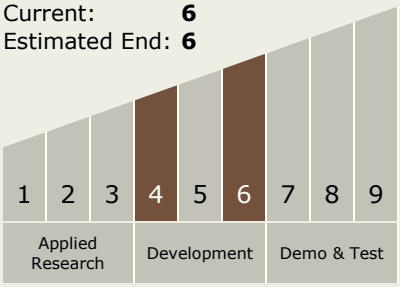
## Technology Maturity (TRL)

Start: **4**
Current: **6**
Estimated End: **6**




## Technology Areas

**Primary:**

- TX08 Sensors and Instruments
  - TX08.3 In-Situ Instruments and Sensors
    - TX08.3.3 Sample Handling

## Target Destinations

The Moon, Mars, Outside the Solar System, The Sun, Earth, Others Inside the Solar System